Montana Fish, Wildlife & Parks (FWP)

1400 South 19th Avenue, Bozeman MT, 59718

Draft Environmental Assessment

Environmental Assessment for the Conservation of Native Westslope Cutthroat Trout in Brays Canyon Creek by removal of Nonnative Brook Trout with Rotenone

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Removal of non-native fish.

B. Agency Authority for the Proposed Action:

87-1-702. Powers of department relating to fish restoration and management.
Authority to conduct the proposed actions comes from the Montana Administrative Code (87-1-702). Specifically, this statute authorizes Montana Fish, Wildlife & Parks (FWP) "to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects."

87-1-201 FWP powers and duties: The department shall implement programs that:

(i) manage wildlife, fish, game, and nongame animals in a manner that prevents the need for listing under 87-5-107 or under the federal Endangered Species Act, 16 U.S.C. 1531, et seq.;
(ii) manage listed species, sensitive species, or a species that is a potential candidate for listing under 87-5-107 or under the federal Endangered Species Act, 16 U.S.C. 1531, et seq., in a manner that assists in the maintenance or recovery of those species. Section 87-1-201(9)(a) M.C.A.

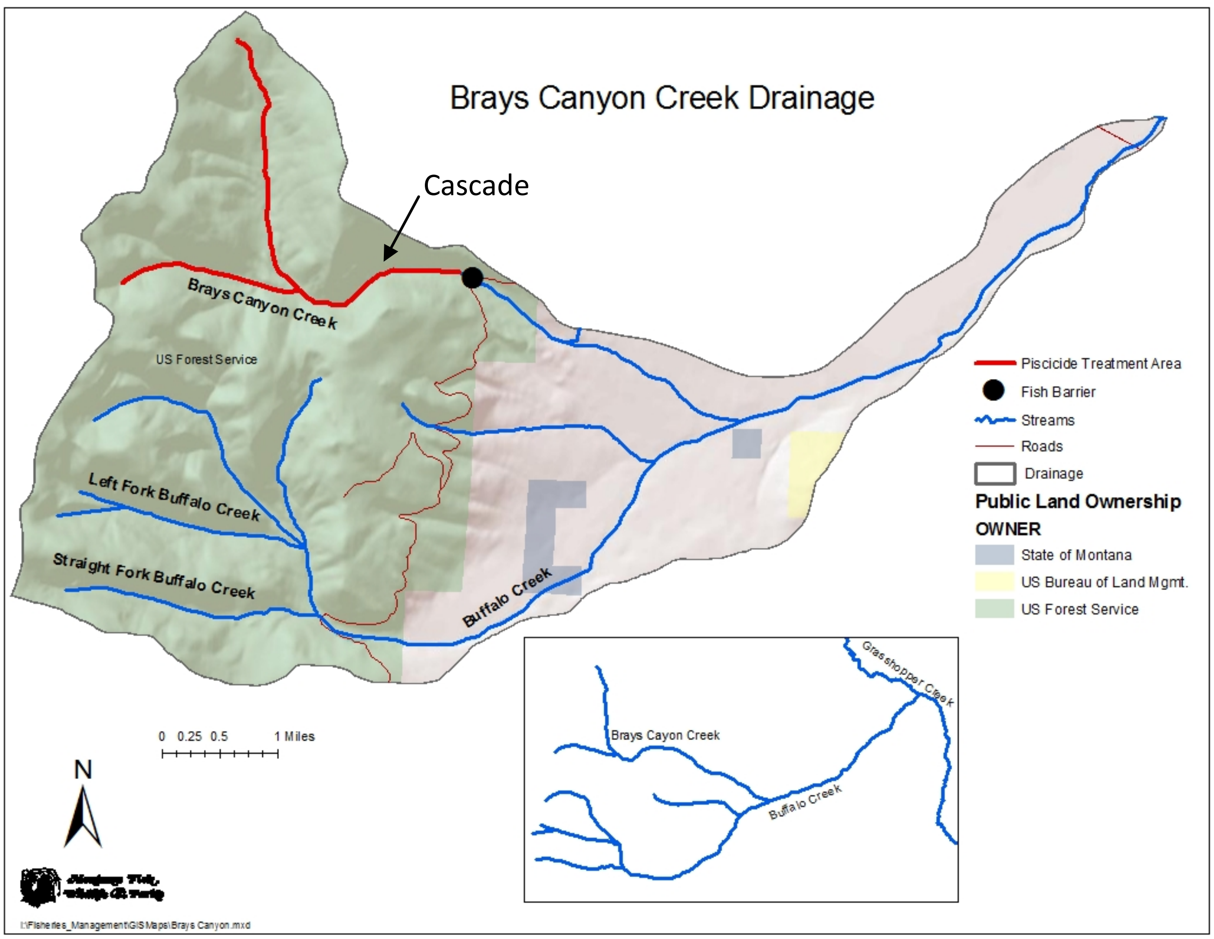
C. Estimated Commencement Date: August 2015. Subsequent treatments may be necessary to ensure achievement of the desired objective of eradicating nonnative brook trout.

D. Location of the Project:
The project site is located in Beaverhead County approximately 25 miles west of the town of Dillon, MT; T22N R13W S 16, 17, 20, 21, 26, 27, 28, and 29. Brays Canyon Creek (including its forks) is a small, southwesterly flowing stream that intersects Buffalo Creek 4.8 miles upstream of its confluence with Grasshopper Creek. Stream discharge measurements are shown in Table 1. The portion of the stream that is proposed for rotenone treatment flows through property managed or owned by the U.S. Forest Service, Dillon Ranger District (USFS) (Figure 1).

Table 1. Brays Canyon Creek watershed stream discharge measurements and locations. Brays Canyon Creek stream miles are the distance from the confluence with Buffalo Creek and Brays Canyon Creek tributary stream miles are the distance from the confluence with mainstem Brays Canyon Creek.

Location	Date	Stream Mile	Discharge (cfs)
Brays Canyon Creek	August 22, 2012	2.7	1.7
Brays Canyon Creek	August 22, 2012	4.4	0.8
West Fork Brays Canyon Creek	August 22, 2012	0.2	0.5

Figure 1. Map depicting the location of Brays Canyon Creek within the Grasshopper Creek drainage and land ownership within the Brays Canyon Creek drainage.



E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – The treated length of Brays Canyon Creek and tributaries would be a maximum of 5.7 stream miles.

5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

F. Overlapping Jurisdictions: U.S. Forest Service - Dillon Ranger District
Montana Department of Environmental Quality

G. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

The area of the Brays Canyon Creek drainage targeted for westslope cutthroat trout (WCT) conservation is the fish-occupied habitat in the mainstem of Brays Canyon Creek above a perched culvert fish barrier at a road crossing located at stream mile 2.7 (Figure 2), and includes about 5.7 miles of Brays Canyon Creek and its unnamed tributaries.

Figure 2. Brays Canyon Creek fish barrier. This structure will isolate the WCT population from non-native fish.

Background and Need for the Proposed Action
Westslope cutthroat trout, Montana's state fish, has declined in abundance, distribution, and genetic diversity throughout its native range (Shepard et al. 2003). Reduced distribution of

WCT is particularly evident in the Missouri River drainage of Montana where genetically pure populations are estimated to persist in about 4% of habitat they historically occupied. Major factors contributing to this decline include competition with nonnative brook *Salvelinus fontinalis*, brown *Salmo trutta*, and rainbow *O. mykiss* trout that were first introduced in Montana in the 1890's, hybridization with rainbow and Yellowstone cutthroat trout *O. c. bouvieri*, habitat changes, and isolation to small headwater streams. Due to these threats, most remaining WCT populations in the Missouri River drainage are considered to have a low likelihood of long-term (100 years) persistence unless conservation actions are implemented (Shepard et al. 1997). The U.S. Fish and Wildlife Service has been petitioned to list WCT as a threatened species on two occasions but found listing under the Endangered Species Act (ESA) was not warranted stating, "The conservation efforts presently being accomplished as part of the routine management objectives of State and Federal agencies, and as part of formal interagency agreements and plans, provide substantial assurance that the WCT subspecies is being conserved." Nevertheless, the species remains a Species of Concern in Montana with projects like the proposed Brays Canyon Creek WCT conservation contributing to WCT remaining unlisted under the ESA.

Protection of existing WCT populations is the highest priority for conservation of WCT in Montana (FWP 2007). Objective 1 of the *Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana* is "Maintain, secure, and/or enhance all cutthroat trout populations designated as conservation populations , especially the genetically pure components." The *Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana* was cooperatively developed and signed by American Wildlands, Blackfeet Tribe, Crow Tribe, Confederated Salish and Kootenai Tribes, Federation of Fly-Fishers, Glacier National Park, Greater Yellowstone Coalition, Montana Chapter of the American Fisheries Society, Montana Department of Natural Resources & Conservation, Montana Farm Bureau, Montana Fish, Wildlife & Parks, Montana Stockgrowers' Association, Montana Trout Unlimited, Montana Wildlife Federation, Natural Resource Conservation Service, Plum Creek, private landowners, Bureau of Land Management, U.S. Fish & Wildlife Service, U.S. Forest Service, and Yellowstone National Park.

Brays Canyon Creek is presently occupied by genetically unaltered native WCT and non-native brook trout. The genetically unaltered WCT population is presently not isolated from non-native brook trout in the drainage which places them at high risk of extirpation. The factors that resulted in creation of a brook trout population are unknown although it likely resulted from previous introduction of brook trout elsewhere in the Grasshopper Creek watershed and subsequent migration into the Brays Canyon Creek drainage. Brook trout have been annually removed from Brays Canyon Creek via electrofishing since 2009 but have not been eradicated (Table 2). Brook trout abundances have been reduced upstream of a cascade (stream mile 3.6) such that the majority of the brook trout population now occurs between it and the barrier (stream mile 2.7; Table 2). Eradication of brook trout in this 0.9 mile reach by electrofishing has been ineffective because higher habitat complexity there lowers electrofishing efficiency. Moreover, the relatively abundant brook trout population that occurs in this reach undermines upstream electrofishing eradication efforts by serving as a source from which fish emigrate upstream.

Table 2. Relative distribution and abundance of WCT and brook trout in Brays Canyon Creek upstream of the fish barrier.

Year	% composition of trout population above barrier (mile 2.7)		% composition of trout population above cascade (mile 3.6)		% of total brook trout population	
	WCT	Brook trout	WCT	Brook trout	Above cascade	Between cascade and barrier
2004	91	9	100	0	0	100
2009	71	29	-	-	-	-
2011	-	-	94	6	-	-
2012	70	30	92	8	17	83
2014	56*	44*	95	5	5	95

*WCT abundances below the cascade were not recorded.

No irrigation withdrawals occur in the project area and land management activities by the USFS are consistent with native trout conservation goals (see Attachment 1 – letter from USFS).

According to the Montana Natural Heritage Database, there are no records of amphibian Species of Concern in the Brays Canyon Creek drainage; however, it is possible that Columbia spotted frogs *Rana luteiventris* are present. Rotenone can cause mortality of this species if exposure occurs at tadpole stages; however, in other rotenone projects in southwest Montana adult Columbia spotted frogs did not exhibit rotenone mortality. Because only stream habitats would be treated, it is unlikely that tadpoles will be affected; these life stages typically occur only in lotic or standing waters. During the time that rotenone would be in the water (August), adults of all amphibian species will be mobile and able to avoid rotenone treated water simply by moving.

According to the Montana Natural Heritage Database, there are also no aquatic invertebrate Species of Concern known to inhabit the Brays Canyon Creek Drainage, nevertheless FWP policy calls for aquatic invertebrate sampling prior to rotenone application and again one year later to assess change in assemblage.

<u>Proposed Action</u>

The proposed action is to remove all non-native brook trout in the Brays Canyon Creek drainage upstream of the fish barrier at stream mile 2.7 (Figure 1) by using rotenone-based piscicides in conjunction with electrofishing. Piscicide would be actively neutralized such that is does not affect fish or aquatic organisms downstream of the fish barrier. Treated reaches would initially include only Brays Canyon Creek between stream mile 3.6 (cascade) and the barrier (about 1 stream mile). Electrofishing will continue to be used to remove brook trout in upstream reaches. If electrofishing and the aforementioned piscicide treatment are unsuccessful at eradicating brook trout from the drainage by 2017, then upstream portions of the drainage would be selectively treated with piscicide as necessary. The genetically pure WCT population in the drainage would be salvaged prior to treatment by capturing as many individuals as possible by electrofishing and holding them in untreated sections of stream or springs. After the treatment has been completed, salvaged genetically pure WCT would be released. The WCT population would be annually monitored via electrofishing following the proposed project until it has recolonized treated reaches, at which point less frequent monitoring will occur.

The proposed project would result in a genetically unaltered WCT population occupying approximately 5.7 miles in isolation from non-native trout. A protected, genetically pure WCT population of this size in the Missouri River drainage in Montana is uncommon.

FWP has used rotenone as a fisheries management tool since 1948, principally to improve angling quality or for native fish conservation. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, Oceania, southern Asia, and North, South, and Central America. For centuries rotenone has been, and still is, used by native people to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s. Rotenone has also been used as a natural insecticide for gardening and to control parasites such as lice on domestic livestock (Ling 2002).

Rotenone acts by inhibiting oxygen transfer at the cellular level. It is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Trout are among the most susceptible species of fish to rotenone. Mammals, birds, and other non-gill breathing organisms do not have this rapid absorption route into the bloodstream, and thus can tolerate exposure to concentrations much higher than that used to kill fish.

In 2011, the State of Arizona convened the Rotenone Review Advisory Committee, which was comprised of diverse interests that extensively studied rotenone and the Arizona Game & Fish Department's use of rotenone for fish management projects (Guenther et al. 2011). The committee, including interests initially opposed to rotenone use due to environmental and human health concerns, unanimously concluded "that rotenone is an important fisheries management tool that can be used safely and effectively" and affirmed the Arizona Game & Fish Department's position that rotenone is an important fisheries management tool. The committee was composed of members of the Arizona State Senate and House of Representatives, Arizona departments of Agriculture, Environmental Quality, Game & Fish, Health Services, and Water Resources, municipalities, various private interests including law firms and sportsman and agricultural interests, and federal agencies such as the U.S. Forest Service, the U.S. Fish & Wildlife Service, the Bureau of Land Management, and the Environmental Protection Agency. The press release and committee report are available at http://azgfd.net/artman/publish/NewsMedia/Advisory-panel-affirms-Strict-Game-and-Fish-procedures-assure-that-rotenone-is-a-safe-effective-fisheries-management-tool.shtml.

Specifics of the Proposed Treatment

The boundaries for this treatment would include up to the entirety of the Brays Canyon Creek drainage upstream of the fish barrier at stream mile 2.7 (Figure 1). In 2015 and subsequently as needed, the reach between the cascade (stream mile 3.6) and the barrier (stream mile 2.7; 0.9 total miles) would be treated. Brook trout will continue to be removed by electrofishing from the rest of the drainage upstream of stream mile 3.6. If brook trout are not eradicated from the Brays Canyon Creek drainage by 2017, then additional reaches upstream of the barrier may be treated as necessary based on results of electrofishing.

Prior to applying rotenone to the stream, genetically pure WCT would be captured by electrofishing and held in untreated reaches or off-channel habitat for re-introduction after completion of the rotenone treatment. Brook trout would be removed by applying rotenone to Brays Canyon Creek upstream of the fish barrier. In August 2014, brook trout occupied Brays Canyon Creek to stream mile 6.0 and several unnamed tributaries. Based on this fish distribution, the total stream length treated would be up to 5.7 miles.

Perennial sections of the stream would be treated with a diluted rotenone liquid mixture using constant flow stations (Figure 3) as well as backpack sprayers to treat disconnected waters, slow moving stream margins, and backwaters where the mainstem waters may not mix well. Treatment of these areas is essential for two reasons: 1) as fish begin to feel the effects of rotenone,e they move to stream margins or calm water areas to seek refuge, and 2) if they detect the rotenone in the water, they tend to seek out waters where they do not detect it. The rotenone formulation that would be used at Brays Canyon Creek was developed specifically to minimize the likelihood of detection. The effects of rotenone can be reversed if fish can access untreated water. Stream water would be used to dilute rotenone in the backpack sprayers and the constant flow stations.

Figure 3. A constant flow station.

The identified stream reaches would be treated with a rotenone based piscicide, likely CFT Legumine ™ 5% or Prenfish ™ 5% liquid rotenone. Springs and seeps may be treated with Prentox™ 7% powdered rotenone "doughballs" (a mixture of sand, gelatin, and powdered rotenone). The toxic effects of the rotenone would be contained within the boundaries of the project area.

On site assays using caged fish (bioassays) would determine the appropriate rotenone concentration and treatment times necessary to cause mortality of the rainbow x cutthroat hybrid and brook trout. A bioassay is conducted by applying the anticipated maximum necessary rotenone concentration at one site for 4 or 8 hours and measuring the response of sentinel fish at various distances downstream to determine how far the rotenone remains effective. If sentinel fish are showing mortality within 4 hours of exposure, the bioassay would be terminated at 4 hours. If they are not showing mortality within 4 hours, it would continue to the 8 hour mark. In bioassays conducted for previous projects and in those projects themselves, mortality occurred within 4 hours of exposure to 1 ppm rotenone. Simultaneously, sentinel fish are exposed to various concentrations of rotenone in aerated buckets to determine the minimum effective rotenone concentration. The effective concentration is expected to be consistent with the label recommendations for concentrations for "normal pond use" (i.e., 0.5 to 1 part per million [ppm] liquid rotenone, which is 0.025 to 0.050 ppm active rotenone). Streams similar to Brays Canyon Creek where rotenone has been used to remove non-native trout species required no more than 1.0 ppm liquid rotenone. In all instances where this has occurred, sculpins have survived treatments using 1.0 ppm. Salvaged WCT would be released once sentinel trout have survived for 4 hours post-treatment.

Rotenone would be primarily applied through the use of constant flow stations. Each constant flow station dispenses a precise amount of diluted rotenone into the stream (Figure 4) based on measured stream discharge. Liquid rotenone would be applied to the stream at regularly spaced intervals based on the bioassays expected to be no more frequent than 2-hour stream travel time. The duration of the application would also be determined by the bioassays, but based on previous experience would likely be no more than 4 hours.

Figure 4. Photo showing trickle of rotenone/water mix (outlined by the yellow box) being applied to a stream.

FWP anticipates the entire chemical treatment can be completed in about one week. Treatments would start in the upstream reaches and progress downstream. Block nets would be placed in the stream overnight to prevent fish from moving into previously treated stream reaches. When the treatment ends each day, fresh water from untreated areas upstream would begin to dilute the piscicide concentration, and oxidation would continue to break down remaining rotenone in the treated reaches of Brays Canyon Creek. Additionally, active neutralization at the fish barrier with potassium permanganate would continue until sentinel fish posted immediately upstream of the neutralization station survive for a minimum of four hours indicating a sub-lethal concentration of rotenone.

Previous treatments at other locations have shown that fish killed by rotenone rapidly decay and are difficult to find even after a few days post treatment. Significant accumulations of dead fish above the barrier would be collected and dispersed in the stream to reduce attractiveness to scavengers. Information regarding human and animal consumption of rotenone exposed fish is discussed in Part III, section 8, Risk/Health Hazards.

Subsequent treatments may be necessary to ensure achievement of the desired objective of eradicating brook trout. Effectiveness of the initial treatment would be ascertained through electrofishing surveys of the treated sections of Brays Canyon Creek and associated tributaries. The same treatment, safety measures, and precautions used during the first treatment would be utilized during a second treatment if it is necessary. Additionally, if removal of brook trout by electrofishing from upstream reaches is unsuccessful by 2017, then targeted treatments of specific reaches following the aforementioned protocol would occur as needed.

Neutralization of the rotenone would begin immediately at or downstream of the fish barrier. Rotenone treated water passing the fish barrier (Figures 1 and 2) would be neutralized by applying potassium permanganate to the stream (Figure 5) per FWP policy. Potassium permanganate is widely used to treat wastewater and rapidly oxidizes and breaks down in natural streams. Application of potassium permanganate to the stream turns the stream water purple (Figure 6). According to the CFT Legumine label, potassium permanganate should be applied to water at the appropriate concentration to compensate for organic demand of the stream so that enough remains to neutralize the rotenone. In previous projects conducted in southwest Montana, 2 - 5 ppm potassium permanganate has been sufficient to achieve neutralization of 1 ppm rotenone within ½ hour of contact time, and in some instances less than 15 minutes. The discharge of the stream would be measured prior to treatment, and the potassium permanganate would be applied at an appropriate rate to meet organic demands and to neutralize the rotenone. Potassium permanganate requires 15 to 30 minutes of contact time to fully neutralize rotenone, which will occur within 1/4 to 1/2 mile below the fish barrier in Brays Canyon Creek. Because Brays Canyon Creek does not reach the Buffalo Creek for an additional 2.7 miles, adequate travel time to fully neutralize rotenone before it contacts other streams exists.

The effectiveness of the potassium permanganate at neutralizing rotenone would be measured using two methods: caged fish at 30 minutes travel time below the neutralization station would be used to measure the toxicity of the water to ensure neutralization objectives have been met, and by use of a colorimeter that measures surplus potassium permanganate concentration in the stream.

A potassium permanganate concentration of 0.5 – 1.0 ppm at 30 minutes below the neutralization site ensures that neutralization is adequate. Because trout are one of the most sensitive animals to rotenone (i.e., they are affected by a much lower rotenone concentration than most other test animals; Schnick 1974), they serve as an excellent indicator of its presence in the water.

Figure 5. Neutralization system using potassium permanganate.

Figure 6. A stream turned purple by potassium permanganate applied to neutralize rotenone.

For situations where stream travel time is less than 12 hours from the lowermost point of rotenone application to the neutralization station, which is expected to be the situation in Brays Canyon Creek, FWP policy is as follows:

Step 1: Sentinel fish must be placed immediately above the neutralization station.

Step 2: When the travel time is 4 hours or less from the lowest point in the drainage where rotenone is being applied to the neutralization station, start neutralization 2 hours before the theoretical arrival time of the rotenone. When travel time is more than 4 hours, start neutralization at a time equal to ½ the theoretical arrival time. For example, if there is 8 hours of travel time, start the neutralization 4 hours before the theoretical arrival time.

Step 3: Neutralization must be continued until the last of the rotenone has theoretically passed the neutralization station (calculated as the time of last application of rotenone plus the travel time to reach neutralization station), and then stopped only after sentinel fish placed immediately above the neutralization station survive an additional 4 hours without stress.

After completion of the rotenone application, FWP would use caged fish immediately above the neutralization station to evaluate when the waters are no longer toxic to fish. The CFT Legumine label specifies that once caged fish show no signs of distress for 4 hours, the stream water is considered to no longer be toxic, and neutralization can be discontinued. Past FWP projects conducted in Montana have shown that this label procedure is accurate.

Benefits of the Proposed Action

The primary purpose of this project is to help achieve the goal of ensuring the long-term, self-sustaining presence of WCT in the upper Missouri River drainage by securing a genetically pure WCT population in the Brays Canyon Creek drainage. With successful removal of nonnative trout, the benefits of the proposed effort would include:

- Fulfilling the State's obligation to restore and expand remnant genetically pure WCT populations (FWP 2007).
- Reducing threats that may encourage requests for listing WCT under the Endangered Species Act.
- Securing a genetically pure WCT population presently at high risk of extirpation.
- Helping to achieve the management goal for cutthroat trout in Montana of long-term, self-sustaining persistence across the species historic range.

PART II. ALTERNATIVES

Alternative 1 – No Action
The no action alternative would be to cease efforts to secure genetically pure WCT in Brays Canyon Creek. Selection of this alternative would not fulfill the State's obligation secure existing remnant genetically pure WCT populations (FWP 2007), and would not reduce threats to the species that encourage requests for listing WCT under the ESA. The genetically pure WCT population in the Brays Canyon Creek drainage would eventually be extirpated and replaced by non-native brook trout. None of the effects described below would occur relative to the present resource condition, although a unique and rare native fish species would be extirpated in the Brays Canyon Creek drainage.

Alternative 2 (Proposed Action) – Removal of non-native brook trout with rotenone and electrofishing from Brays Canyon Creek
The proposed action would include salvage of genetically pure WCT and removal of existing non-native brook trout from Brays Canyon Creek upstream of the barrier at stream mile 2.7 with rotenone. Non-native brook trout would be removed from stream mile 3.6 to the fish barrier (0.9 total miles) with rotenone in 2015 and subsequently as needed. Brook trout will continue to be removed by electrofishing from upstream reaches. If brook trout are not eradicated from Brays Canyon Creek by 2017, then upstream reaches will be treated with rotenone as necessary. WCT will be salvaged from all reaches of stream where rotenone is applied prior to treatment.

Alternative 3 – Electrofishing removal of brook trout from Brays Canyon Creek
Complete removal of non-native brook trout by electrofishing was determined not to be a feasible alternative for restoring WCT in Brays Canyon Creek and was eliminated from further consideration. Multiple-pass electrofishing has been used to attempt to eradicate brook trout from Brays Canyon Creek since 2009. Although brook trout abundances have been reduced in the upper portion of the drainage, this approach has been less successful in the 0.9 miles above the barrier because of higher habitat complexity. Moreover, the relatively abundant brook trout population that occurs in this reach undermines upstream

electrofishing eradication efforts by serving as a source from which fish emigrate upstream. Multiple-pass electrofishing has been used to attempt to eradicate unwanted trout (primarily nonnative brook trout) from short sections of several small streams in northcentral Montana (Big Coulee, Middle Fork Little Belt, and Cottonwood creeks) and in southwest Montana (Muskrat, Whites and Staubach creeks). From 2004 – 2010, electrofishing was used annually to remove brook trout from approximately 6 miles of Dyce Creek west of Dillon. Through 2010, it is estimated that this effort reduced Dyce Creek brook trout abundance by 80 - 95%, but due to the complexity of the stream habitat (e.g., over hanging vegetation and debris jams), and length of the project reach (6 miles), it was not expected that brook trout could be completely eradicated using only electrofishing (Paul Hutchinson, Fisheries Biologist, BLM Dillon District, personal communication). Continued electrofishing removal efforts in Dyce Creek would have required significant labor resources on an annual basis for an indefinite period of time. Rotenone was used to remove the remaining brook trout from Dyce Creek in August 2011 and 2012. Electrofishing efforts following treatment found no brook trout in the Dyce Creek treatment area. Brays Canyon Creek was similarly electrofished to remove brook trout from 2009 to 2014. Although brook trout abundances were reduced during this time period, they were not eradicated because of stream complexity. The size of the proposed Brays Canyon Creek project area (5.7 stream miles and similar base flows to Dyce Creek) would require annual labor-intensive multiple-pass electrofishing efforts that would not result in complete removal of non-native brook trout. Therefore, complete removal of non-native brook trout by solely electrofishing was determined not to be a feasible alternative for securing WCT in Brays Canyon Creek; selection of this alternative would not fulfill the State’s obligation secure existing remnant genetically pure WCT populations (FWP 2007), and would not reduce threats to the species that encourage requests for listing WCT under the ESA. Some effects described below related to water and invertebrates would not occur, although most other listed effects presently occur and would continue.

PART III. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. <u>LAND RESOURCES</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. **<u>WATER</u>** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	see 2a,f
i. Effects on any existing water right or reservation?		X				2i
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		YES	2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		YES	2m

Comment 2a: The proposed project is designed to intentionally introduce a piscicide to surface water to remove non-native fish. The impacts would be short term and minor. Prentox (7% powder) and CFT Legumine (5% liquid) rotenone are EPA registered pesticides and are safe to use for removal of unwanted fish. The concentration of CFT Legumine (5% liquid) proposed is 0.5 to1 part per million. Prentox (7% powder) may be used on a very limited basis in a sand and gelatin mix to treat any springs and seeps within the treatment area.

There are three ways in which rotenone can be neutralized once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity

(Ware 2002; ODFW 2002; Loeb and Engstrom-Heg 1971; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46^{o} F the half-life of rotenone ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46^{o} F pond water 14 days after a treatment. By day 18, the concentrations were sub-lethal to trout. The second method for neutralization involves dilution by untreated water. This may be accomplished by ground water or untreated surface water flowing into a lake or stream. The final method of neutralization involves the application of an oxidizing agent such as potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to neutralize the rotenone. Neutralization is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 2007).

In the case of Brays Canyon Creek, potassium permanganate would be used to neutralize the rotenone as it passes the barrier. FWP expects the treated stream above the barrier to naturally detoxify within 48 hours after rotenone application ceases. During previous treatments on other streams, the treated waters have detoxified within 24 hours after cessation of rotenone application as untreated water from upstream sources flows into the treated area and through the aforementioned physical and chemical breakdown processes. Inert ingredients (e.g., carriers) in liquid rotenone volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication. It is anticipated that most dead fish would be left on-site in the water. Previous treatments have shown that fish rapidly decay and are difficult to find even after a few days post treatment. In addition, dead fish provide nutrients to the stream, benefiting primary and secondary production. However, large accumulations of dead fish would be collected and dispersed throughout the system to avoid attracting scavengers.

Comment 2f: No contamination of groundwater is anticipated to result from this project. Rotenone binds readily to sediments, and is broken down by soil and in water (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 65 feet from the pond was analyzed and no sign of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 21 day period and showed no sign of contamination. In 2005, FWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well located 30 yards from the pond was tested and neither Prenfish nor inert ingredients were found in the well.

Inert ingredients in CFT Legumine volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication.

Comment 2i: Securing an existing WCT population would have no affect on water rights.

Comment 2j: The CFT Legumine and Prentox labels state "….Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir…". Irrigation and stockwater are not withdrawn from Brays Canyon Creek upstream of the fish barrier. The treatment zone would be thoroughly posted to caution against use of the water while rotenone is being applied (2 – 4 days) and thereafter for a precautionary period – 4-6 days total. Finally, rotenone passing downstream of the lower bounds of the treatment area (below the fish barrier; Figure 1) would be neutralized with the addition of potassium permanganate to the stream. In total, impacts to irrigation and potable water intakes would be short term and minor and would be mitigated as necessary.

Comment 2m: FWP would apply for a Notice of Intent (NOI) for a Pesticide General Permit from Montana DEQ.

3. AIR **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))		X				
b. Creation of objectionable odors?			X		YES	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regulations?		X				

Comment 3b: CFT Legumine does not contain the same level of aromatic petroleum solvents (toluene, xylene, benzene and naphthalene) of other rotenone formulations and as a consequence does not have the same odor concerns and has less inhalation risks. Dead fish would result from this project and may cause objectionable odors as they decay, though previous treatments have shown fish decay rapidly and are difficult to find even after a few

days post treatment. Any large concentrations of dead fish on stream banks will be placed in the stream to reduce odors.

4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X			4a
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: Prior to and during treatment there would be some human trampling of vegetation along the stream during the placement and monitoring of constant flow stations and sentinel fish locations. Rotenone does not have an effect on plants at concentrations used to kill fish. Impacts from trampling vegetation are expected to be short term and minor.

5. FISH/WILDLIFE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		YES	5b
c. Changes in the diversity or abundance of nongame species?			X		YES	5c
d. Introduction of new species into an area?		X				5d
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?			X		YES	5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				See 5d

Comment 5b: The proposed action would result in securing an extant genetically pure westslope cutthroat trout population in Brays Canyon Creek and the removal of an existing non-native brook trout population that occupies approximately 5.7 miles of stream. The WCT population would be expected to occupy a similar distribution, although abundances may increase in the absence of brook trout.

The proposed removal of non-native brook trout from Brays Canyon Creek is considered a minor impact because the current use of the brook trout fishery is nominal (based on angler use data), and non-native brook trout would continue to be abundant throughout the Beaverhead watershed and in numerous other streams in the upper Missouri River basin. The project is intended to maintain or improve the abundance and range of genetically pure WCT, a rare and unique species with limited distribution in the Beaverhead watershed and upper Missouri River drainage. Westslope cutthroat trout are currently protected by catch-and-release regulations in most streams in the central fish district, including all streams within the Beaverhead watershed. Restoration efforts like the proposed action are intended to increase overall WCT abundance, which may result in greater fishing opportunities and harvest of this rare native species in the future.

Comment 5c: Nongame (non-target) animals that could be directly impacted by the proposed project include aquatic invertebrates and amphibians. As described below, the expected population level impacts to non-target organisms range from non-existent to short term and minor. No amphibian or aquatic invertebrate Species of Concern (SOC) or Threatened and Endangered (T&E) species were identified in the Brays Canyon Creek Drainage in a search of the Montana Natural Heritage database.

Aquatic Invertebrates:

Numerous studies indicate that rotenone has temporary or minimal effects on aquatic invertebrates. One study reported that no meaningful reduction in aquatic invertebrates was observed due to the effects of rotenone, which was applied at levels twice as high as the levels proposed for this project (Houf and Campbell 1977). Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation). In all cases, the reduction of aquatic invertebrates was temporary and most treatments used a higher concentration of rotenone than proposed for this project (Schnick 1974). In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Temporary changes in aquatic invertebrate community structure due to a rotenone treatment could be similar to what is observed after natural (e.g., fire) and anthropogenic (livestock grazing) disturbances (Wohl and Carline 1996; Mihuc and Minshall 1995; Minshall 2003), although the physical impacts and resulting modifications of invertebrate assemblages after these types disturbances can last for a much longer period than a piscicide treatment.

Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989), and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992; Matthaei et al. 1996). Headwater reaches of Brays Canyon Creek that do not hold fish or only hold genetically pure WCT would not be treated with rotenone and would provide a source of aquatic invertebrate colonists. In addition, recolonization would include aerially dispersing invertebrates from downstream areas (e.g., mayflies, caddisflies).

The FWP Piscicide Policy requires sampling for Species of Concern (SOC) and benthic macroinvertebrates prior to and following a treatment. As stated above, no SOC were identified in the Brays Canyon Creek Drainage in a search of the Montana Natural Heritage database.

In southwest Montana aquatic invertebrates are routinely collected prior to transfers of WCT to historically fishless habitat in headwater mountains streams (e.g., Eureka, Little Tepee, Little Tizer, Elkhorn, Crazy, Whitehorse creeks). In all cases, these collections have shown aquatic invertebrate assemblages typical of headwater streams in western Montana, and in no cases have threatened or endangered species been discovered. The same type of aquatic invertebrate assemblage would be expected in Brays Canyon Creek, which was not historically fishless, and the possibility of eliminating a rare or endangered species is very unlikely.

Mammals and Birds

Mammals are generally not affected by rotenone treatments because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests by Marking (1988) fed forms of rotenone to rats and dogs as part of their diet for periods of six months to two years and observed effects such as diarrhea, decreased food consumption, and weight loss. He reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. Studies of risk for terrestrial animals found that a 22 pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can ingest rotenone under field conditions is by drinking lake or stream water, a half pound animal would need to drink 66 gallons of water treated at 1 ppm to receive a fatal dose.

The EPA (2007) made the following conclusion for small mammals and large mammals;

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (39.5 mg/kg * 0.350 kg = 13.8 mg = 13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30.4 mg/kg * 1 kg = 30.4 mg = 30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged on the basis of methodology because: 1) the continuous intravenous injection method used in the study leads to "continuously high levels of the compound in the blood," and 2) dimethyl sulfoxide (DMSO) was used to enhance tissue penetration (normal routes of exposure actually slow introduction of chemicals into the bloodstream). Finally, injecting rotenone into the body is not a normal way of assimilating the compound. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Goethem et al. 1981; BRL 1982) or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1000 ppm rotenone over a 10 day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than what is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants and members of lower orders of *Galliformes* were quite resistant to rotenone, and four day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and it is slightly toxic to wildfowl, but to kill Japanese quail required 4500 to 7000 times more than is used to kill fish.

The EPA (2007) made the following conclusion for birds;

> *Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 µg/g in yellow perch (Perca flavescens) to 1.08 µg/g in common carp (Cyprinus carpio) (Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 µg and 95 µg rotenone per fish, respectively. Based on the avian subacute dietary LC_{50} of 4110 mg/kg, a 1000-g bird would have to consume 274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.*

A reduced abundance of aquatic invertebrates and fish may temporally impact local mammals and birds that may prey on these species (e.g, American dipper and mink). The aquatic invertebrate community would recover rapidly from a piscicide treatment, while it would be several years for trout abundance to reach levels present prior to treatment. Impacted birds and mammals are mobile and would likely use untreated portions of the Brays Canyon Creek drainage, adjacent drainages, or the Beaverhead River until full recovery of the Brays Canyon Creek aquatic assemblage.

Donnelly (Montana State University; pers.comm.) found that American dippers in the Cherry Creek drainage exhibited slightly reduced body condition factor the summer after a fall rotenone treatment but fully recovered the year after. He found no effect on reproductive success such as clutch size, chick survival or chick body condition.

A compilation of scientific documentation regarding the food habits of mink indicates that mink are generalists in their diet (Novak 1987). This compilation includes studies conducted in

Montana, and documents that mammals are the most important mink prey item throughout the year, followed by birds and invertebrates. Fish replace birds and invertebrates as the second most important food item in the winter. Mink tend to utilize coarse, slow moving fish rather than faster midstream fish, such as trout, indicating that trout are more likely to escape mink predation, even if they are the only fish available. The ability of the mink to utilize a wide variety of prey bases may reduce competition with more specialized carnivores. Mink are also known to readily colonize new habitat, and to rapidly recolonize habitat where they have been absent.

Amphibians and Reptiles

Amphibians and reptiles potentially found within the Brays Canyon Creek include Columbia spotted frogs (*Rana luteiventris*) (amphibians) and western terrestrial garter (*Thamnophis elegans*) snakes (reptiles). Rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive. Chandler and Marking (1982) found that Southern Leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs (*Ascaphus truei*), and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 mg/L) but the larvae would likely be affected. Billman (2010) applied CFT Legumine (5% rotenone) to a lake in Yellowstone National Park (YNP) in 2006 containing stocked Yellowstone cutthroat trout and to two fishless ponds on the Flying D Ranch in southwestern Montana in 2008. Within 24 hours following application, rotenone caused nearly 100% mortality in gill-breathing amphibian tadpoles, but did not affect non-gill breathing metamorphs, juveniles, and adults. In the year(s) following, tadpole repopulation occurred at all treated water bodies and population levels were similar to, or, in the case of YNP, higher than, pre-treatment levels.

These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians. A fall treatment date is not possible because of heavy use of the drainage for hunting and recreation; however, the Brays Canyon Creek treatment would not include habitats where larval amphibians occur. As such, little to no effect on amphibians is expected because of the low sensitivity of adults to rotenone. A reduced abundance of aquatic invertebrates may temporally impact larval amphibians that prey on these species, though the aquatic invertebrate community would recover rapidly. Reptiles (air-breathing) would not be directly impacted by rotenone treatment, though snakes are known to consume trout which would be temporarily reduced in number by the rotenone treatment.

Based on the information presented in comment 5c, FWP would expect population level impacts to non-target organisms to range from non-existent to short term and minor. These impacts may include temporary loss or diminishment of a food source during recolonization of aquatic invertebrate communities and WCT. FWP would assess the environmental impacts of this project on non-target organisms by monitoring the aquatic invertebrate community with samples collected pre and post treatment.

Comment 5d: Genetically pure WCT already present will be allowed to naturally re-colonize treated potions of stream after all non-native fish are removed.

Comment 5f: There are no threatened or endangered species known to reside in the proposed treatment area in Brays Canyon Creek. Some sensitive terrestrial species that may occasionally occupy the Brays Canyon Creek drainage and could potentially ingest dead fish or treated stream water include great gray owls (*Strix nebulosa*), northern goshawk (*Accipiter gentilis)*, gray wolf (*Canis lupus*), and wolverines (*Gulo gulo*). Fish do not comprise a meaningful part of the diet of most of these species, and none of these species, or other mammals and birds common to the area, would be affected by ingestion of dead fish or treated stream water (see comment 5c).

Western Pearlshell Mussels have not been documented in the Brays Canyon Creek Drainage.

Comment 5i. See comment 5d.

B. <u>HUMAN ENVIRONMENT</u>

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?			X			6a
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a: The noise generated from this project would be short term, minor, and in an isolated area.

7. **LAND USE** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				7a
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?					X	7c
d. Adverse effects on or relocation of residences?		X				

Comment 7a: Existing land use practices, grazing standards, season of grazing, and grazing load would not be affected by removal of non-native brook trout.

Comment 7c: The Brays Canyon Creek drainage can be accessed by public roads, though the majority of the treatment area is not directly accessible by road. As required by EPA regulation, the project area would be closed to the public during the period that rotenone remains fatal to fish. Proper warning through news releases, signing the project area, road closure, and administrative personnel in the project area should be adequate to keep recreationists from unintentionally accessing the area and being exposed to any treated waters or dead fish. At proposed treatment levels, stream water would not be toxic to wildlife, livestock, or humans. No livestock are scheduled to be on either private pastures or USFS allotments occurring in the treatment area in 2015, so they would not be exposed to the rotenone treatment.

8. **RISK/HEALTH HAZARDS** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		YES	8b
c. Creation of any human health hazard or potential hazard?			X		YES	see 8a,c
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: The principal risk of human exposure to hazardous materials from this project would be limited to the applicators. All applicators would wear safety equipment required by the product labels and the material safety data sheet (MSDS) such as respirator, goggles, rubber boots, protective clothing, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide and potassium permanganate. At least one, and most likely several, Montana Department of Agriculture certified pesticide applicators would supervise and administer the project. Materials would be transported, handled, applied, and stored according to the label specifications to reduce the probability of human exposure or spill.

Comment 8b: FWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plan, first aid, emergency responder information, personal protective equipment, and monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by FWP the risk of emergency response is minimal and any affects to existing emergency responders would be short term and minor.

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. They are: a 10x database uncertainty factor, a 10x inter-species uncertainty factor and a 10x intra-species uncertainty factor. The target margin of exposure (MOE) is 1000. These uncertainty factors have been applied to protect against potential human health effects. It is also important to note that many toxicity studies involve subjecting laboratory specimens to unusually high concentrations of rotenone, or conducting tests on animals that would not normally be exposed to rotenone during use in fisheries management. Table 2 summarizes the EPA toxicological endpoints of rotenone (from EPA 2007).

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded;

> *"…When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study*

measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.

Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.
Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile. It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV)..."

Table 2. EPA toxicological endpoints of rotenone (from EPA 2007).

Exposure Scenario	**Dose Used in Risk Assessment, Uncertainty Factor (UF)**	**Level of Concern for Risk Assessment**	**Study and Toxicological Effects**
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000 aRfD = 15 mg/kg/day = 0.015 mg/kg/day 1000	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = 0.375 mg/kg/day = 0.0004 mg/kg/day 1000	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

For evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the four principle reasons for concluding there is a low risk. First, the rapid natural degradation of rotenone. Second, using active neutralization measures by applicators, such as potassium permanganate. Next, properly following piscicide labels which prohibit the use near water intakes. Finally, proper signing, public notification or area closures which limit public exposure to rotenone treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application from dermal contact and/or incidental ingestion, but requires a waiting period of 3 days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water and swimming does not exceed the EPA level of concern (EPA 2007).

Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo[99] which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the Legumine formulation. Solvents such as xylene, trichloroethylene (TCE) and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, n-butylbenzene, 1,2,4 trimethylbenzene and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and 1-hexanol were likewise present but either analyzed, calculated, or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resins (rotenone). Analysis of methyl pyrrolidone in Legumine showed it represents about 9% of the formulation (Fisher 2007). Regarding the constituent ingredients in Legumine, the analysis concluded;

> *"…None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs (polyethylene glycol) are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir, and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon*

a review of the physical chemistry of the chemicals identified, we conclude that they are rapidly biodegraded, hydrolyzed and/or otherwise photolytically oxidized and that the chemicals pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water, or ingestion exposure scenarios and no relevant regulatory criteria are exceeded in estimated exposure concentrations…"

The Legumine MSDS states "…when working with an undiluted product in a confined space, use a non-powered air purifying respirator…and… air-purifying respirators do not protect workers in oxygen-deficient atmospheres…". It is not likely that workers would be handling Legumine in an oxygen deficient space during normal use, however, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

The advantage of CFT Legumine over Prenfish, another liquid rotenone product, is that CFT Legumine has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene. By comparison, Prenfish has a strong chemical odor. CFT Legumine is virtually odor-free and performs almost identically to Prenfish. Prentox, or powdered rotenone, is simply the ground up roots of the *Derris* plant, and as a consequence contains no petroleum or other man-made ingredients. The toxicity of Prentox is therefore attributed exclusively to the rotenoid compounds.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira et al. (1984) reported that the Indians extensively handled the plants during a mastication process (chewing), and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices or involve human health risk precautions as those involved with fisheries management programs.

Several studies have evaluated incidence of development of Parkinson's disease (PD) following exposure to a variety of pesticides, including rotenone. The results of epidemiological studies of pesticide exposure have been highly variable (Guenther et al. 2011). Studies have found no correlations between pesticide exposure and PD (e.g., Jiménez-Jiménez 1992; Hertzman 1994; Engel et al. 2001; Firestone et al. 2010), some have found correlations between pesticide exposure and PD (e.g., Hubble et al. 1993; Lai et al. 2002; Tanner et al. 2011) and some have found it difficult determine which pesticide or pesticide class is implicated if associations with PD occur (e.g., Engel et al. 2001; Tanner et al. 2009). The state of Arizona conducted an exhaustive review to the risks to human health of rotenone use as a piscicide (Guenther et al. 2011). They concluded: "To date, there are no published studies that conclusively link exposure to rotenone and the development of clinically diagnosed PD. Some correlation studies have found a higher incidence of PD with exposure to pesticides among other factors, and some have not. It is very important to note that in case-control correlation studies, causal relationships cannot be assumed and some associations identified in odds-ratio analyses may be chance associations. Only one study (Tanner et al. 2011) found an association between rotenone and paraquat use and PD in agricultural workers, primarily farmers.

However, there are substantial differences between the methods of application, formulation, and doses of rotenone used in agriculture and residential settings compared with aquatic use as a piscicide, and the agricultural workers interviewed were also exposed to many other pesticides during their careers. Through the EPA re-registration process of rotenone, occupational exposure risk is minimized by: new requirements that state handlers may only apply rotenone at less than the maximum treatment concentrations (200 ppb), the development of engineering controls to some of the rotenone dispensing equipment, and requiring handlers to wear specific PPE."

The occupational risks to humans from rotenone application is low if proper safety equipment and handling procedures are followed as directed by the product labels (EPA 2007). The major risks to human health from rotenone come from accidental exposure during handling and application. This is the only time when humans are exposed to concentrations that are greater than that needed to remove fish. To prevent accidental exposure to liquid formulated or powdered rotenone, the Montana Department of Agriculture requires applicators to be:

- *Trained and certified to apply the pesticide in use*
- *Equipped with the proper safety gear, which, in this case, includes respirator, eye protection, rubberized gloves, hazardous material suit*
- *Have product labels with them during use*
- *Contain materials only in approved containers that are properly labeled*
- *Adhere to the product label requirements for storage, handling, and application*

Beyond this, FWP imposes additional requirements on its employees, such as progressive professional training, experience and training requirements for achieving and maintaining progressive Levels of Expertise, and ensuring that all required treatment actions are completed. These actions include, but are not limited to, ensuring proper public notification and signing of the treatment area, ensuring that all rotenone applicators properly use personal protective equipment, properly measuring the volume of water to be treated and calculating the appropriate quantity of rotenone to be applied, ensuring that initiation and cessation of neutralization follows FWP procedures, and ensuring that non-target organism monitoring is conducted.

To reduce the potential for exposure of the public during the proposed use of CFT Legumine, areas treated with rotenone would be closed to public access during the treatment. Signs would be placed at access points informing the public of the closure and the presence of rotenone treated waters. Personnel would be onsite to inform the public and escort them from the treatment area should they enter. Potassium permanganate would neutralize any remaining rotenone before it leaves the project area. The efficacy of the neutralization would be monitored using fish (the most sensitive species to the chemical) and a hand held chlorine meter (chlorimeter). Therefore, the potential for public exposure to rotenone treated waters is very minimal.

9. **COMMUNITY IMPACT** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. <u>PUBLIC SERVICES/TAXES/UTILITIES</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _______________		X				
b. Will the proposed action have an effect		X				

upon the local or state tax base and revenues?						
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				10e.
f. Define projected maintenance costs		X				

Comment 10e. No additional funding beyond routine budget levels will be necessary to conduct this project or monitor results and no revenue will be generated by this project. Estimated costs for rotenone and potassium permanganate are less than $500. Adequate quantities of both items are currently on-hand, remaining from previously conducted FWP projects.

11. AESTHETICS/RECREATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X		yes	See 11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: There would be a temporary loss of angling opportunity in 0.9 miles of Brays Canyon Creek drainage between the time of fish removal and for several years (3 – 7) until genetically pure WCT have been reestablished to similar abundances. However, WCT will remain at similar abundances upstream of the treatment reach. The brook trout fishery would be eliminated above the barrier, though brook trout fisheries would remain in numerous streams throughout the Beaverhead watershed. In most cases cutthroat trout fisheries in Montana streams are catch and release only. After eradication of brook trout and securing of WCT in the Brays Canyon Creek drainage FWP would evaluate whether the fishery could support harvest, and if possible, regulations would be changed to allow anglers the option of harvesting WCT for consumption.

12. CULTURAL/HISTORICAL RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				12c
d. Will the project affect historic or cultural resources?		X				

Comment 12 c. The project site is located within the aboriginal range of several Native American tribes. Cultural officers for tribes which would have interest in this project will be contacted through the MEPA public comment process to identify any potential effects on existing religious or sacred uses of the area. There would be no ground breaking activities associated with this project, and there are no known potential impacts to historical, cultural or religious values.

13. SUMMARY EVALUATION OF SIGNIFICANCE Will the proposed action, considered as a whole:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)				X		
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X				Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X					13f
g. List any federal or state permits required.						13g

Comment 13a: Completion of this project will increase the cumulative distribution and abundance of secured pure WCT in the Beaverhead Watershed, thereby reducing risk of extinction and fulfilling FWP's obligations to "to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects" and "manage wildlife, fish, game, and nongame animals in a manner that prevents the need for listing under 87-5-107 or under the federal Endangered Species Act." Individuals or fertilized eggs from a secured, pure WCT population in Brays Canyon Creek may also be used in future WCT restoration projects elsewhere.

Comments 13e and f: FWP has a long history of completing rotenone projects; however, the use of piscicides can generate angst among some people. It is not known if this project would have organized opposition. If there is sufficient interest we will hold a public open house meeting concerning the project during the public comment period. FWP has also worked closely with the local USFS staff and private landowners during the development of this project, and no issues have been identified.

Comment 13g: FWP consulted with the USFS Dillon Ranger District and during the planning and development phases of this project. No special use permit is required by FWP. The following permit would be required from the Montana Department of Environmental Quality:

- Notice of Intent under the Montana DEQ Pesticide General Permit

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) *Is an Environmental Impact Statement Required (EIS)?*

No. An EIS is not required under the Montana Environmental Policy Act (MEPA) because the project lacks significant impacts to the physical, biological or human environment. Impacts of the proposed action are expected to be short-term and minor, and are appropriately addressed through an Environmental Assessment.

B) *Public involvement:*

The public will be notified through local newspapers and through contact with local landowners, sporting and recreational groups, and others who have previously indicated interest in similar projects. This EA will also be published on the Montana Fish, Wildlife & Parks web page (http://fwp.mt.gov/default.html). The public comment period will be open for 30 days. This level of public involvement is believed adequate for the proposed project as recent and similar type piscicide efforts completed by FWP have produced no significant issues or controversy.

C) *Addresses to submit written comments:*

There is a 30 day comment period for this EA. Written comments can be mailed or emailed to the address below, and must be received by 5:00 pm, July 16, 2015. Please include name and address with any comment.

Matt Jaeger
Montana Fish, Wildlife & Parks
730 ½ N. Montana
Dillon, MT 59725
406-683-9310
mattjaeger@mt.gov

D) *Name, title, address, and telephone number of the person responsible for preparing this EA document:*

Same as above.

E) *Agencies contributing to the document:*
U.S. Forest Service, Dillon Ranger District (USFS)

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Attachment 1:

Project support letters from the USFS

USDA United States Department of Agriculture | Forest Service | Beaverhead-Deerlodge National Forest Dillon Ranger District | 420 Barrett Street Dillon, MT 59725 406-683-3900

File Code: 2670
Date: June 1, 2015

Matt Jaeger
Montana Fish, Wildlife & Parks
730 ½ N. Montana
Dillon, MT 59725

Dear Mr. Jaeger:

This letter is to inform you of the Dillon Ranger District's support of the "Conservation of Native Westslope Cutthroat Trout in Brays Canyon Creek by removal of Nonnative Brook Trout with Rotenone" project. Westslope cutthroat trout (WCT) conservation is an emphasis area for the Fisheries Program on the Beaverhead-Deerlodge National Forest and we are pleased to partner with you in this effort.

I believe our land management direction is consistent with your efforts to expand and secure cutthroat trout populations in the Brays Canyon Creek drainage. We will continue to emphasize implementation of that direction and look forward to working with you on this and future cutthroat restoration projects; each of which are important for accomplishing goals and objectives set forth in the 2007 MOU and conservation Agreement for Cutthroat Trout.

I appreciate MFWP's commitment to native species restoration on National Forest lands and look forward to working cooperatively with you to effectively and efficiently complete this work.

If you have any questions, please feel free to contact Forest Fisheries biologist Jim Brammer at (406) 683-3916.

Sincerely,

Robert Gump

ROBERT GUMP
Acting District Ranger

cc: Jim Brammer, Beaverhead-Deerlodge NF